

# Floral diversity across habitat types of Harike Wildlife Sanctuary, Punjab, India

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**ABSTRACT**

The current study is conducted at Harike Wildlife Sanctuary with a precise multiple foot survey in different seasons and throughout all habitats, from September 2019 to March 2021. Total 386 species belonging to 320 genera and 103 families have been recorded from the study area. Total 84 trees, 40 shrubs, 173 herbs, 33 climbers, 33 types of grasses, 6 submerged vegetation, 10 floating vegetation, 3 ferns and 4 succulents were documented. Dominating families are Leguminosae, Poaceae, Compositae, Malvaceae, Solanaceae and Euphorbiaceae. Habitat area and species diversity in each habitat, different sources of species, occurrence status, species percentage of concerned families and checklist of plants have been mentioned in this paper. During the field survey, many medicinal plants like *Boerhavia diffusa*, *Bacopa monnieri*, *Tribulus terrestris* and *Centella asiatica* including one threatened plant (*Withania coagulans*) have also been documented.

**Key word:** Punjab, Harike, Habitat, Plants, Checklist, threatened, *Withania coagulans*

**1. INTRODUCTION**

The Punjab plain is located under the semi-arid and sub-tropical zone of India, associated with extensive river systems. The exogenic forces of river systems have manifesting diversity in physical characters in the landscapes of Punjab (Naruse, 1976), these diverse topographical features provide a variety of habitats viz., highlands, dry ravines, wetland, marsh and swamps. The habitat diversity also significant for floral variety as topography directs the water flow and moisture gradient. The documentation of Punjab flora has been done earlier by Bamber (1916), Nair (1978), Meenakshi & Sharma (1985), Sharma & Khosla (1989), Sharma (1990), Sharma & Rajpal (1995), Tiwana et al. (2005), Jerath et al. (2006), Santapau (1958) and Kaur et al. (2017). The Harike Wildlife Sanctuary (hereafter referred as HWS) is situated at the confluence of Beas and Satluj rivers, a potential site for rich floral diversity. The documentation of vegetation composition is essential for formulation of conservation management strategies to maintain ecological functions, hence the present study is an endeavour for investigating the floral diversity in various habitats of HWS.

### Study area

HWS is situated between  $31^{\circ}05'15''$  -  $31^{\circ}14'15''$  N Lat. and  $74^{\circ}55'30''$  -  $75^{\circ}07'30''$  E Long. in the state of Punjab (fig 1), spreading over an area of approximately 86 sq. km, sharing its boundaries with Ferozpur, Tarn Taran and Kapurthala districts. The establishment of a barrage in 1952 across the confluence of Beas and Sutlej rivers manifested the largest man-made wetland of the north plains of India. Harike wetland is also a source of largest canal, Indira Gandhi Canal with two great channels, Rajasthan feeder (650km) and Ferozpur feeder (51.30 km) provides water security to Punjab, Haryana and Rajasthan.

In 1990, the Sanctuary got the status of Ramsar site, due to its significance for water security and wildlife conservation. The wetland supports a large population of resident and migratory birds including threatened species viz. Ferruginous pochard (*Aythya nyroca*), Pallas's fish eagle (*Haliaeetus leucoryphus*), Greater spotted eagle (*Clanga clanga*) and Oriental darter (*Anhinga melanogaster*). The critically endangered species listed in IUCN Red (2007) like Indus river dolphin (*Platanista gangetica minor*) and Gharial (*Gavialis gangeticus*) can also be found in this wetland. The mammal species like Golden jackal (*Canis aureus*), Jungle cat (*Felis chaus*) and porcupine (*Hystrix Indica*) is common in HWS. The Sanctuary is surrounded by villages with moderate population, mostly engaged in agrarian activities.

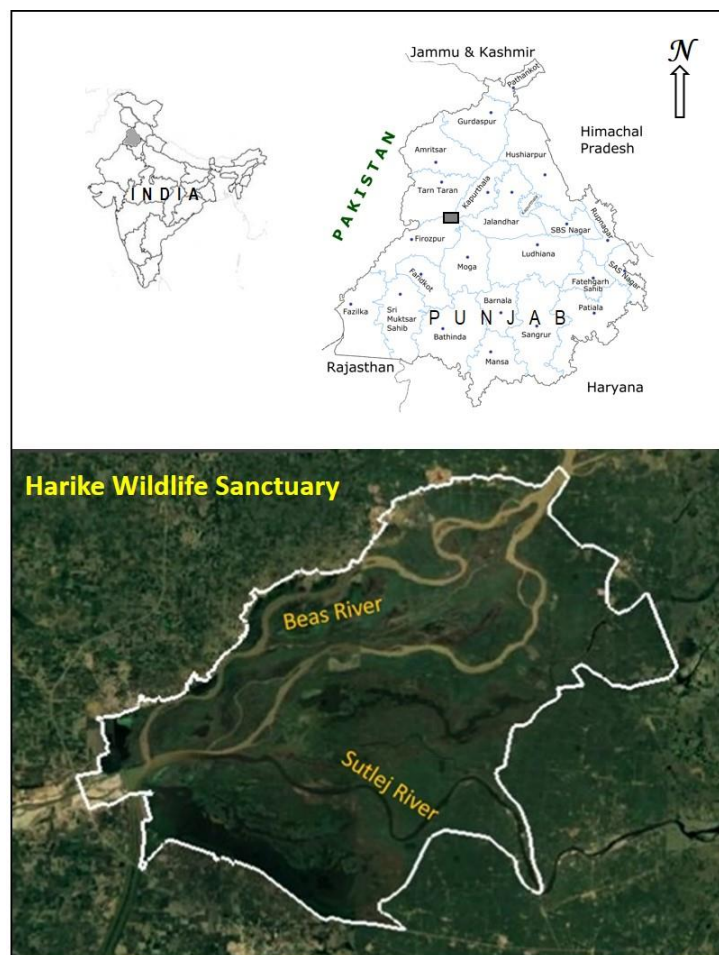


Figure 1: Harike Wildlife Sanctuary (Satellite image)

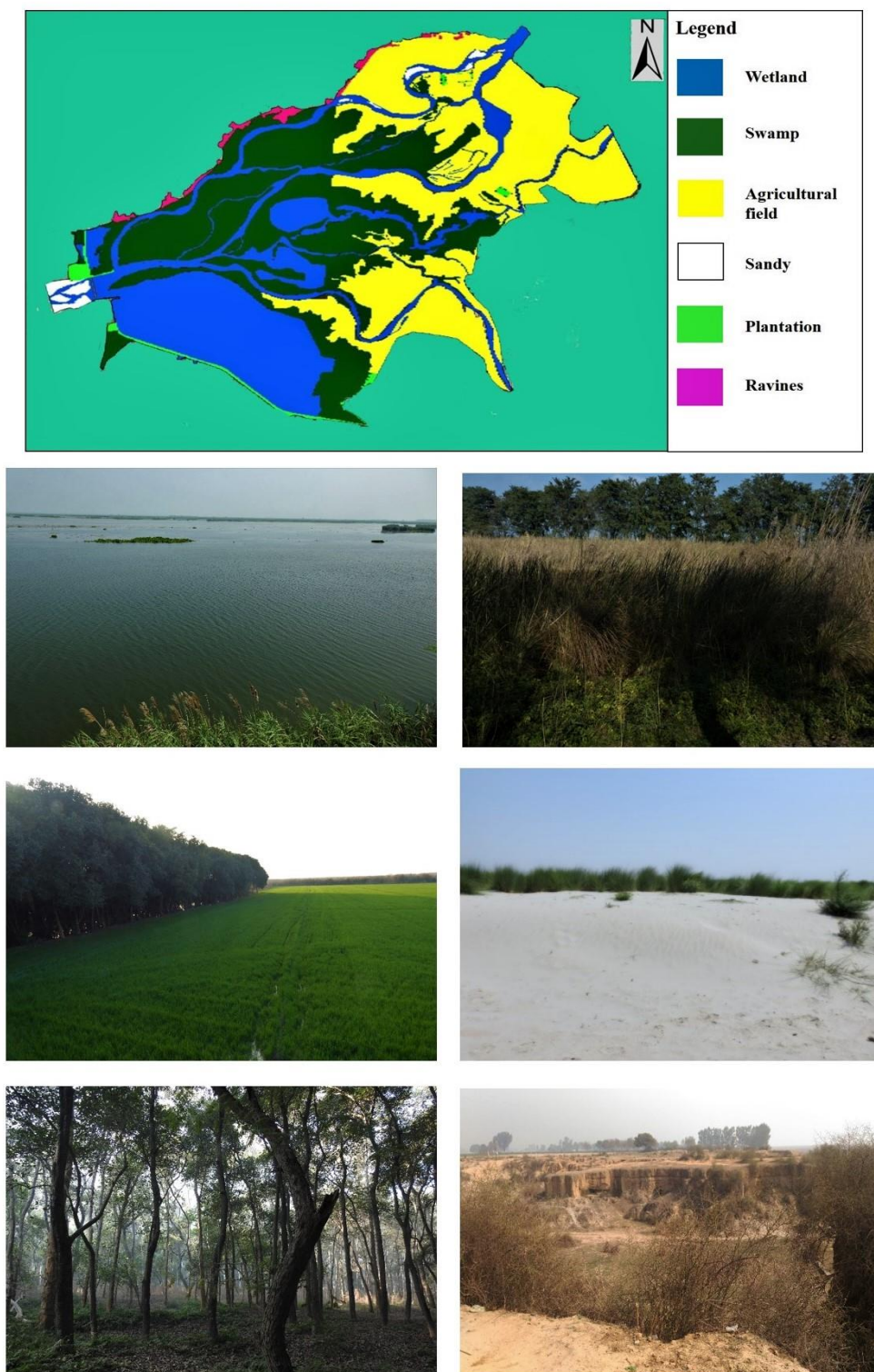
## 2. MATERIAL AND METHODS

The intensive field surveys on foot was carried out between September 2019 to March 2021 in different habitats across seasons. A total of sixty-five field surveys has been conducted for primary data collection. The Sanctuary was classified into six major habitats viz., Wetland, Sandy plain, Plantation, Agricultural field, Ravine and Swamps based on physical characteristics and vegetation. In each habitat type vegetation data was recorded on habit, source (Wild, Cultivated and Ornamental) as well as intensive photography (Picture of flowers, leaves, fruits and barks) has been done through mobile and digital camera for documentation and evidence of plants. The distribution of plants was registered through ocular estimation viz., Occasional (species recorded in more than three habitats with a regular interval during surveys), Frequent (the species present more than three habitats), Rare (the species restricted to single habitat) and Very Rare (less than four individuals found during the survey). To determine the spatial

expansion of a particular habitat, habitat map was prepared with the help of Google earth pro and Arc GIS10.5 after precise ground-truthing. The plant species were identified following Nair (1978), Kumar (2001), Sharma & Khosla (1989), Sharma & Rajpal (1995), Sharma (1990). The checklist of plants, as currently accepted name of HWS was prepared based on [www.theplantlist.com](http://www.theplantlist.com) and [www.flowersofindia.net](http://www.flowersofindia.net). The voucher specimens of all the recorded plants as photographic record have been submitted to the WII herbarium (Wildlife Institute of India, Dehradun).

### 3. RESULTS

#### Land use pattern



**Figure 2:** Distribution of habitats in HWS

The Sanctuary is a mosaic of habitats with the association of lotic and lentic wetlands with a total area of 8600 hectares. The habitat map is shown in Fig 2, Dynamic moisture levels and topographical features are supporting a variety of flora. The largest area recorded under Agricultural field habitat with 35.15% (3022.6 hectares) followed by Swamp habitat 32.28% (2776.2 hectares), Wetland 29.15% (2507.2 hectares), Ravines 1.23% (106.12 hectares), Plantation with 1.16% (99.68 hectares) and the least area found under sandy habitat with 1.03% (88.2 hectares). Present active flood zone covers wetland, Swampy and Sandy habitat, collectively accounts for 62.46% of the total area of HWS. This seasonal flooding allows various vegetation (*Sisymbrium irio*, *Ipomoea aquatica*, *Lemna minor* and *Marsilea quadrifolia*) to propagate and support food for migratory and native birds therefore extended ecotone and temporary wetlands are vital for sustainability of ecosystems in HWS.

### Classification and distribution of species

There are around 1843 species have been reported by Sharma, 1990 therefore in the present investigation, about 20.94% plants from flora of Punjab state has been documented. After a precise field survey total of 386 species have been documented under 103 families under seven habit types in various habitats, shown in Table 1.

**Table 1:** Number of species, genera and family according to habit.

Habit	Species	Genus	Family
Trees	84	70	34
Shrubs	40	34	20
Herbs	173	136	51
Climbers	33	27	12
Grasses	33	30	1
Submerged vegetation	6	6	4
Floating vegetation	10	10	7
Ferns	3	3	3
Succulent	4	4	2

Overall dominating families are Leguminosae with 13.21% (51 species), Poaceae 8.55 % (33 species), Compositae 5.18% (20 species), Malvaceae 4.92% (19 species), Solanaceae 3.63% (14 species), and Euphorbiaceae 3.63 % (14 species), Number of species and its percentage under concerned family according to Habit is shown in Table 2.

**Table 2:** Number of species mentioned under particular family according to habits.

(T: Trees, S: Shrubs, H: Herbs, Cl: Climbers, G: Grasses, Sv: Submerged vegetation, Fv: Floating vegetation, Fr: Ferns Su: Succulent)											
Family	T	S	H	Cl	G	Sv	Fv	Fr	Su	Total species	Species %
Leguminosae	24	3	21	3	-	-	-	-	-	51	13.2
Poaceae	-	-	-	-	33	-	-	-	-	33	8.6
Compositae	-	1	19	-	-	-	-	-	-	20	5.2
Malvaceae	3	4	12							19	4.9
Euphorbiaceae	1	6	7							14	3.6
Solanaceae		3	11							14	3.6
Apocynaceae	1	6	1	3						11	2.9
Convolvulaceae		1	1	8						10	2.6
Lamiaceae	2	2	6							10	2.6
Amaranthaceae			9							9	2.3
Cucurbitaceae				9						9	2.3
Moraceae	9									9	2.3
Brassicaceae			7							7	1.8
Plantaginaceae			7							7	1.8



Polygonaceae			6	1					7	1.8
Apiaceae			5						5	1.3
Bignoniaceae	5								5	1.3
Lythraceae	3		1			1			5	1.3
Asparagaceae				1				3	4	1.0
Meliaceae	4								4	1.0
Myrtaceae	4								4	1.0
Nyctaginaceae		1	3						4	1.0
Rutaceae	1	3							4	1.0
Acanthaceae		1	2						3	0.8
Amaryllidaceae			3						3	0.8
Araceae			1			2			3	0.8
Caryophyllaceae			3						3	0.8
Chenopodiaceae			3						3	0.8
Hydrocharitaceae						3			3	0.8
Menispermaceae				3					3	0.8
Onagraceae			3						3	0.8
Papaveraceae			3						3	0.8
Portulacaceae			3						3	0.8
Verbenaceae		1	2						3	0.8
Aizoaceae			2						2	0.5
Arecaceae	2								2	0.5
Asteraceae			1	1					2	0.5
Boraginaceae			2						2	0.5
Cannabaceae			1	1					2	0.5
Combretaceae	2								2	0.5
Commelinaceae			2						2	0.5
Crassulaceae			2						2	0.5
Cyperaceae			2						2	0.5
Nymphaeaceae						2			2	0.5
Oleaceae	1	1							2	0.5
Pedaliaceae			2						2	0.5
Phyllanthaceae	1		1						2	0.5
Rhamnaceae	1	1							2	0.5
Rubiaceae		1	1						2	0.5
Salicaceae	2								2	0.5
Salviniaceae						2			2	0.5
Sapotaceae	2								2	0.5
Zygophyllaceae			2						2	0.5
Alismataceae			1						1	0.3
Anacardiaceae	1								1	0.3
Annonaceae	1								1	0.3
Aspleniaceae							1		1	0.3
Athyriaceae							1		1	0.3
Basellaceae				1					1	0.3

Cactaceae									1	1	0.3
Capparaceae		1								1	0.3
Capparaceae	1									1	0.3
Caricaceae	1									1	0.3
Casuarinaceae	1									1	0.3
Ceratophyllaceae						1				1	0.3
Cleomaceae			1							1	0.3
Cupressaceae		1								1	0.3
Cycadaceae	1									1	0.3
Ebenaceae	1									1	0.3
Equisetaceae								1		1	0.3
Geraniaceae			1							1	0.3
Haloragaceae						1				1	0.3
Juncaceae			1							1	0.3
Lemnaceae							1			1	0.3
Marsileaceae			1							1	0.3
Menyanthaceae							1			1	0.3
Molluginaceae			1							1	0.3
Moringaceae	1									1	0.3
Musaceae	1									1	0.3
Nitrariaceae			1							1	0.3
Oxalidaceae			1							1	0.3
Phrymaceae			1							1	0.3
Pontederiaceae							1			1	0.3
Potamogetonaceae						1				1	0.3
Primulaceae			1							1	0.3
Proteaceae	1									1	0.3
Punicaceae		1								1	0.3
Putranjivaceae	1									1	0.3
Ranunculaceae			1							1	0.3
Rosaceae		1								1	0.3
Rubiaceae	1									1	0.3
Sapindaceae				1						1	0.3
Sapindaceae	1									1	0.3
Scrophulariaceae			1							1	0.3
Simaroubaceae	1									1	0.3
Sphenocleaceae			1							1	0.3
Tamaricaceae	1									1	0.3
Typhaceae			1							1	0.3
Ulmaceae	1									1	0.3
Urticaceae			1							1	0.3
Vitaceae				1						1	0.3
Zamiaceae		1								1	0.3
Zingiberaceae			1							1	0.3
Total	84	40	173	33	33	6	10	3	4	386	100.00

The herbs account for 44.82% with dominating families like Leguminosae (21 species) followed by Compositae (19 species), Malvaceae (12 species), and Solanaceae (11 species). Common herb species distributed among habitats are *Cannabis sativa*, *Chenopodium album*, *Oxalis corniculata*, *Parthenium hysterophorus*, *Aerva javanica*, *Ageratum conyzoides*, *Artemisia scoparia* and *Senna occidentalis*. All the species of herbs recorded from 51 families. Tree species contributes to 21.76% with 34 families, species distributed among habitats are *Dalbergia sissoo*, *Syzygium cumini*, *Terminalia arjuna*, *Leucaena leucocephala*, *Ficus religiosa*, *Prosopis juliflora*, *Parkinsonia aculeata*, *Eucalyptus camaldulensis* and *Kigelia africana*. Maximum number of Tree species listed under family Leguminosae ( 24 species) followed by Moraceae (9 species), Bignoniaceae (5 species) and Meliaceae ( 4 species). The shrubs account for 10.36 % with 20 families, comprises of species like *Lantana camara*, *Ricinus communis*, *Ziziphus nummularia* and *Grewia tenax*. six shrub species were documented from each family (Apocynaceae & Euphorbiaceae).

Climbers account for 8.2% belonging to 12 families, species such as *Abrus precatorius*, *Mukia maderaspatana*, *Convolvulus arvensis* and *Oxystelma esculentum* were common among some habitats. Grasses such as *Saccharum spontaneum*, *Cynodon dactylon*, *Dactyloctenium aegyptium*, *Phragmites karka* and *Setaria viridis* contributed 8.6%. The common floating vegetation was dominated by *Eichhornia crassipes*, *Pistia stratiotes* and *Nelumbo nucifera* and accounted for 2.6% belonging to 7 families. The submerged vegetation like *Hydrilla verticillata*, *Vallisneria natans* and *Najas minor* dominated the vegetation and contributed 1.6%. The contribution of succulents was 1.0% and *Sansevieria aethiopica* and *Opuntia dillenii* were present in some habitats. Ferns accounted for 0.8% belonging to 3 families and the most common species was *Diplazium esculentum*. During the survey, various habits were registered in each habitat (Table 3) according to field observation carried out in 18 months in HWS.

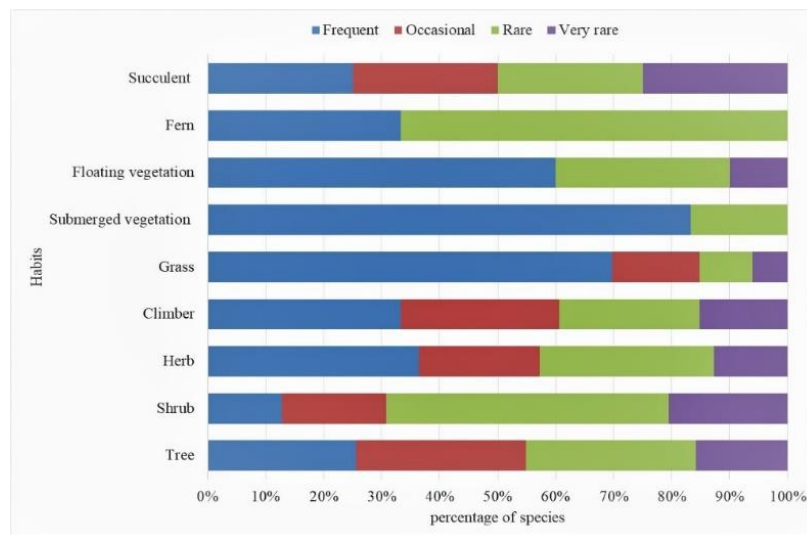
**Table 3:** Species distribution across the habitats according to habit

(T: Trees, S: Shrubs, H: Herbs, C: Climbers, G: Grasses, Sv: Submerged vegetation, Fv: Floating vegetation, Fr: Ferns Su: Succulent)											
Habitat/Habit	T	S	H	C	G	Sv	Fv	Fr	Su	Total species	Species (%)
Wetland	12	1	26	2	4	6	10	3	0	64	9.6
Sandy	18	1	35	2	8	0	0	1	0	65	9.8
Plantation	74	17	95	20	15	0	0	1	3	225	33.7
Agricultural field	23	8	72	12	19	0	0	0	0	134	20.1
Ravine	25	8	46	9	9	0	0	0	1	98	14.7
Swampy	25	1	24	12	7	2	7	3	0	81	12.1

Among habitats, the maximum number of species were present in Plantation, with most common species such as *Terminalia arjuna*, *Syzygium cumini*, *Leucaena leucocephala*, *Prosopis juliflora*, *Dalbergia sissoo*, *Ficus benghalensis*, *Ficus palmata*, *Kigelia Africana*, *Cannabis sativa*, *Sida acuta*, *Senna occidentalis*, *Achyranthes aspera* and *Chenopodium album*, followed by Agricultural field with common species such as *Melia azedarach*, *Cordia myxa*, *Malva parviflora*, *Ziziphus mauritiana*, *Calotropis procera*, *Ageratum conyzoides*, *Artemisia scoparia*, *Erigeron Canadensis* and *Rumex dentatus*. The minimum number of species were recorded from wetland habitat comprised of submerged vegetation (*Hydrilla verticillata*, *Vallisneria natans*) and floating vegetation (*Eichhornia crassipes*, *Pistia stratiotes* and *Nelumbo nucifera*).. Moist wetlands' shore were dominated by tree species like *Bombax ceiba*, *Eucalyptus camaldulensis*, *Salix alba*, *Phoenix sylvestris*, *Terminalia arjuna* and *Syzygium cumini* and herbs such as *Bacopa monnieri*, *Centella asiatica* and *Ranunculus sceleratus* and *Phragmites karka* and *Paspalum distichum* as common grass species (Appendix I).

### Source of plant species

Total 289 species were identified as wild (58 Trees, 13 Shrubs, 143 Herbs, 26 Climbers, 29 Grasses, 6 Submerged and 10 Floating plants, 3 Ferns and 1 Succulent) followed by ornamental plants with 56 species (19 Trees, 21 Shrubs, 11 Herbs, 2 Climbers and 3 succulent) and cultivated plants with 41 species (7 Trees, 6 Shrubs, 19 Herbs, 5 Climbers and 4 Grasses).



**Figure 3:** Proportion of habit under different occurrence category

The species like *Albizia lebbeck*, *Pongamia pinnata*, *Leucaena leucocephala*, *Ammannia baccifera*, *Cascabela thevetia*, *Aerva javanica*, *Parthenium hysterophorus*, *Vachellia nilotica* and *Ipomoea carnea* were witnessed (fig 3) as frequent (136 species). Species such as *Putranjiva roxburghii*, *Cassia fistula*, *Ailanthus excels*, *Acacia catechu*, *Azadirachta indica*, *Commelina benghalensis*, *Rhynchosia minima*, *Dysphania ambrosioides*, *Alhagi maurorum* were observed as Occasional (83 species). Species such as *Terminalia bellirica*, *Pithecellobium dulce*, *Artocarpus heterophyllus*, *Casuarina equisetifolia*, *Cardamine hirsute*, *Capparis decidua*, *Tephrosia purpurea*, *Justicia adhatoda*, *Polygonum plebeium*, *Dendrocalamus strictus*, *Gmelina arborea* and *Peganum multiseptum* were recorded from single habitat, therefore mentioned as Rare (114 species), while species like *Dichrostachys cinerea*, *Phyllanthus emblica*, *Leucas cephalotes*, *Withania coagulans*, *Anisomeles indica*, *Adenostemma platyphyllum*, *Fagonia indica*, *Urtica urens*, *Pedaliium murex*, *Clerodendrum phlomidis* and *Lycium edgeworthii* were found with fewer individuals, hence documented as Very Rare (52 species) categories. The present documentation of plants in various habitats may lead to better conservation and management strategies for the up keep of HWS, as the habitat alteration may likely to take place in the event of climate change and anthropogenic pressure.

#### 4. DISCUSSION

Wetlands are dynamic in nature as per season hence support a variety of perennial and seasonal plants. Sharma et al., 2009 have reported 60 species of angiosperm including *Dalbergia sissoo*, *Toona ciliate*, *Phoenix sylvestris*, *Ipomoea carnea*, and *Withania somnifera* from Dholbaha dam a man-made wetland at foothills of Shivalik hills in Hoshiarpur district of punjab. Out of sixty species, 57 species were found in the Harike wetland. A study from plains of Haryana, 84 species of plants reported from Bindawas wetland in Jhajjar district (Kumar & Dhankhar, 2015), species like *Saccharum munja*, *Ficus palmate*, *Datura metel*, *Ipomoea carnea*, *Zizyphus mauritiana*, *Mesua ferrea*, and *Jatropha gossypifolia* have been reported. Out of 84 species, 79 species are found in this study. In a study at Baanganga wetland, a wetland from the Ganga river system, a total of 178 plant species were recorded from the wetland (Adhikari & Babu, 2008), 116 species were found common between Baanganga and Harike wetland ( a wetland from Beas and Sutlej river system). Some common species are *Bacopa monnieri*, *Veronica anagallis-aquatica*, *Solanum nigrum*, *Tamarix dioica*, *Nymphoides cristata* and *Leucas cephalotes*. Documentation of plant species is very important to keep records of available genetic resources in a particular location therefore this study might help create policies for the conservation of wetlands.

#### 5. CONCLUSION

Habitat diversity in HWS is supporting 386 species of plants, this is around 20.94% of the flora of Punjab state. This study has elaborated the existing assemblage of plant species in each habitat hence might be helpful for developing strategies for conservation of plants besides selecting species for ecological restoration of concerned habitat. The sanctuary is acting as functional gene bank thus providing appropriate habitat to threatened and important medicinal plants, therefore, supporting in-situ conservation of biodiversity.

#### Funding:

This research received no external funding.



**Conflicts of interest:**

The authors declare no conflict of interest.

**Ethical approval**

The ethical guidelines for plants & plant materials are followed in the study for species collection & identification.

**Data and materials availability**

All data associated with this study are present in the paper.

**Appendix I:** Checklist of plant species recorded in various habitats of HWS.

Habit: T, Trees; S, Shrubs; H, Herbs; Cl, Climbers; G, Grasses; Sv, Submerged vegetation; Fv, Floating vegetation; Fr, Ferns; Su, Succulent

Habitat: WL, wetland; SD, Sandy; PL, Plantation; RV, Ravine; SW, Swampy; AG, Agricultural field

Source: W, Wild; O, Ornamental; C, Cultivated

Occurrence: F, Frequent; OC, Occasional; R, Rare; VR, Very rare

Voucher/Photograph No.	Species	Family	Habit	Habitat	Source	Occurrence
WII/HARIKE/SG/125	<i>Abelmoschus esculentus</i> (L.) Moench.	Malvaceae	H	AG	C	OC
WII/HARIKE/SG/298	<i>Abrus precatorius</i> L.	Leguminosae	Cl	PL,RV,SW	W	OC
WII/HARIKE/SG/126	<i>Abutilon indicum</i> (L.) Sweet	Malvaceae	H	SD, PL, RV, SW	W	R
WII/HARIKE/SG/002	<i>Acacia catechu</i> (L.f.) Willd	Leguminosae	T	PL, RV	W	OC
WII/HARIKE/SG/003	<i>Acacia tortilis</i> (Forsk.) Hayne	Leguminosae	T	PL, AG,RV	W	OC
WII/HARIKE/SG/001	<i>Acacia auriculiformis</i> Benth	Leguminosae	T	PL, AG,RV,SW	O	OC
WII/HARIKE/SG/127	<i>Achyranthes aspera</i> L.	Amaranthaceae	H	PL,AG,RV,	W	F
WII/HARIKE/SG/128	<i>Adenostemma platyphyllum</i> Cass	Compositae	H	WL,SW	W	VR
WII/HARIKE/SG/004	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	T	PL	W	R
WII/HARIKE/SG/129	<i>Aerva javanica</i> (Burm.f.) Juss. ex Schult	Amaranthaceae	H	AG, RV,	W	F
WII/HARIKE/SG/383	<i>Agave sisalana</i> Perrine	Asparagaceae	Su	PL	O	OC
WII/HARIKE/SG/130	<i>Ageratum conyzoides</i> (L.) L	Compositae	H	WL, SD, PL, AG, RV, SW	W	F
WII/HARIKE/SG/005	<i>Ailanthus excelsa</i> Roxb.	Simaroubaceae	T	PL, RV. SW	W	OC
WII/HARIKE/SG/006	<i>Albizia lebbek</i> (L.) Benth.	Leguminosae	T	PL. SD, AG, RV, SW	W	F
WII/HARIKE/SG/007	<i>Albizia procera</i> (Roxb.) Benth.	Leguminosae	T	PL, SW	W	F
WII/HARIKE/SG/131	<i>Alhagi maurorum</i> Medik	Leguminosae	H	AG,RV	W	OC
WII/HARIKE/SG/132	<i>Allium cepa</i> L.	Amaryllidaceae	H	AG	C	F
WII/HARIKE/SG/133	<i>Allium sativum</i> L	Amaryllidaceae	H	AG	C	F
WII/HARIKE/SG/008	<i>Alstonia scholaris</i> (L.) R. Br.	Apocynaceae	T	PL	O	OC
WII/HARIKE/SG/134	<i>Alternanthera paronychioides</i> A.St.-Hil.	Amaranthaceae	H	WL	W	F
WII/HARIKE/SG/135	<i>Alternanthera pungens</i> Kunth	Amaranthaceae	H	AG,RV	W	F
WII/HARIKE/SG/136	<i>Alysicarpus ovalifolius</i> (Schum.) Leonard	Leguminosae	H	AG	W	OC
WII/HARIKE/SG/137	<i>Alysicarpus vaginalis</i> (L.) DC	Leguminosae	H	PL,AG	W	OC
WII/HARIKE/SG/138	<i>Amaranthus viridis</i> L.	Amaranthaceae	H	PL	W	OC

WII/HARIKE/SG/139	<i>Ammannia baccifera</i> L.	Lythraceae.	H	AG	W	F
WII/HARIKE/SG/140	<i>Anagallis arvensis</i> L.	Primulaceae	H	WL,SD,PL,AG,RV,SW	W	F
WII/HARIKE/SG/141	<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	H	PL,AG	W	VR
WII/HARIKE/SG/299	<i>Antigonon leptopus</i> Hook. & Arn	Polygonaceae	Cl	PL	O	OC
WII/HARIKE/SG/142	<i>Argemone mexicana</i> Sweet	Papaveraceae	H	RV	W	OC
WII/HARIKE/SG/331	<i>Aristida adscensionis</i> L.	Poaceae	G	RV	W	F
WII/HARIKE/SG/143	<i>Artemisia scoparia</i> Waldst. & Kitam.	Compositae	H	SD,PL,AG,RV,SW	W	F
WII/HARIKE/SG/009	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	T	PL	C	R
WII/HARIKE/SG/332	<i>Arundo donax</i> L.	Poaceae	G	WL,SW	W	F
WII/HARIKE/SG/300	<i>Asparagus officinalis</i> L.	Asparagaceae	Cl	PL	W	VR
WII/HARIKE/SG/382	<i>Asplenium platyneuron</i> (L.) Britton, Sterns & Poggenb	Aspleniaceae	Fr	WL, SW	W	R
WII/HARIKE/SG/144	<i>Astragalus sinaicus</i> Boiss.	Leguminosae	H	RV	W	OC
WII/HARIKE/SG/333	<i>Avena sativa</i> L.	Poaceae	G	AG	W	F
WII/HARIKE/SG/010	<i>Azadirachta indica</i> A. Juss.	Meliaceae	T	PL, SD AG, RV,SW	W	OC
WII/HARIKE/SG/371	<i>Azolla pinnata</i> R. Br.	Salviniaceae	Fv	WL, SW	W	F
WII/HARIKE/SG/145	<i>Bacopa monnieri</i> (L.) Wettst.	Plantaginaceae	H	WL,SW	W	VR
WII/HARIKE/SG/301	<i>Basella alba</i> L.	Basellaceae	Cl	PL	W	OC
WII/HARIKE/SG/011	<i>Bauhinia variegata</i> L.	Leguminosae	T	PL	W	R
WII/HARIKE/SG/146	<i>Berula erecta</i> (Huds.) Coville	Apiaceae	H	WL,SW	W	R
WII/HARIKE/SG/147	<i>Blumea lacera</i> (Burm.f.) DC	Compositae	H	AG,RV,	W	R
WII/HARIKE/SG/148	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	H	PL,AG,RV,SW	W	F
WII/HARIKE/SG/149	<i>Boerhavia erecta</i> L.	Nyctaginaceae	H	RV	W	VR
WII/HARIKE/SG/012	<i>Bombax ceiba</i> L.	Malvaceae	T	PL, WL, SD, SW	W	OC
WII/HARIKE/SG/085	<i>Bougainvillea spectabilis</i> Willd.	Nyctaginaceae	S	PL	O	OC
WII/HARIKE/SG/334	<i>Brachiaria ramosa</i> (L.) Stapf	Poaceae	G	PL	W	F
WII/HARIKE/SG/151	<i>Brassica rapa</i> var. <i>rapa</i> L.	Brassicaceae	H	AG	C	F
WII/HARIKE/SG/150	<i>Brassica oleracea</i> L.	Brassicaceae	H	AG	C	F
WII/HARIKE/SG/152	<i>Bryophyllum pinnatum</i> (Lam.) Oken	Crassulaceae	H	PL,	O	R
WII/HARIKE/SG/013	<i>Butea monosperma</i> (Lam.) Taub.	Leguminosae	T	PL	W	R
WII/HARIKE/SG/086	<i>Cajanus cajan</i> (Linn.) Millsp.	Leguminosae	S	AG	C	R
WII/HARIKE/SG/014	<i>Callistemon viminalis</i> (Sol. ex Gaertn.) G.Don	Myrtaceae	T	PL	W	R
WII/HARIKE/SG/087	<i>Calotropis procera</i> (Aiton) Dryand	Apocynaceae	S	PL, AG, RV,	W	F
WII/HARIKE/SG/153	<i>Cannabis sativa</i> L.	Cannabaceae	H	SD,PL,AG,RV,SW	W	F
WII/HARIKE/SG/088	<i>Capparis decidua</i> (Forssk.) Edgew	Capparaceae	S	RV	W	R
WII/HARIKE/SG/154	<i>Capsella bursa-pastoris</i> (L.) Medik.	Brassicaceae	H	PL,	W	OC
WII/HARIKE/SG/155	<i>Capsicum annuum</i> L.	Solanaceae	H	PL,	C	OC
WII/HARIKE/SG/156	<i>Cardamine hirsuta</i> L.	Brassicaceae	H	SD	W	R
WII/HARIKE/SG/302	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Cl	PL	W	VR
WII/HARIKE/SG/015	<i>Carica papaya</i> L.	Caricaceae	T	PL	C	R
WII/HARIKE/SG/089	<i>Carissa spinarum</i> L.	Apocynaceae	S	PL	O	VR
WII/HARIKE/SG/016	<i>Caryota urens</i> L.	Arecaceae	T	PL	O	R
WII/HARIKE/SG/090	<i>Cascabela thevetia</i> (L.) Lippold	Apocynaceae	S	PL	O	F
WII/HARIKE/SG/017	<i>Cassia fistula</i> L.	Leguminosae	T	PL, RV,SW	W	OC
WII/HARIKE/SG/018	<i>Casuarina equisetifolia</i> L.	Casuarinaceae	T	PL	O	R

WII/HARIKE/SG/157	<i>Catharanthus roseus</i> (L.) G.Don	Apocynaceae	H	PL	O	OC
WII/HARIKE/SG/303	<i>Cayratia trifolia</i> (L.) Domin	Vitaceae	Cl	PL,AG	W	VR
WII/HARIKE/SG/019	<i>Ceiba pentandra</i> L.	Malvaceae	T	PL	O	VR
WII/HARIKE/SG/335	<i>Cenchrus ciliaris</i> L.	Poaceae	G	PL,AG,RV	W	F
WII/HARIKE/SG/158	<i>Centella asiatica</i> (L.) Urb.	Apiaceae	H	WL,SW	W	VR
WII/HARIKE/SG/364	<i>Ceratophyllum demersum</i> L	Ceratophyllaceae	Sv	WL	W	F
WII/HARIKE/SG/091	<i>Cestrum nocturnum</i> L	Solanaceae	S	PL	O	R
WII/HARIKE/SG/159	<i>Chenopodium album</i> L.	Chenopodiaceae	H	PL,AG	W	F
WII/HARIKE/SG/160	<i>Chenopodium murale</i> L.	Chenopodiaceae	H	PL	W	F
WII/HARIKE/SG/336	<i>Chloris barbata</i> Sw.	Poaceae	G	PL	W	VR
WII/HARIKE/SG/337	<i>Chrysopogon zizanioides</i> (L.) Roberty	Poaceae	G	WL,SD,SW	W	OC
WII/HARIKE/SG/020	<i>Chukrasia tabularis</i> A. Juss.	Meliaceae	T	PL	O	OC
WII/HARIKE/SG/161	<i>Cirsium arvense</i> (L.) Scop.	Asteraceae	H	PL,AG,RV,	W	F
WII/HARIKE/SG/304	<i>Citrullus colocynthis</i> (L.) Schrad.	Cucurbitaceae	Cl	RV	W	R
WII/HARIKE/SG/092	<i>Citrus aurantifolia</i> (Christm) Sw.	Rutaceae	S	AG	C	R
WII/HARIKE/SG/162	<i>Cleome viscosa</i> L	Cleomaceae	H	PL	W	OC
WII/HARIKE/SG/093	<i>Clerodendrum inerme</i> (L.) Gaertn	Lamiaceae	S	PL	O	OC
WII/HARIKE/SG/094	<i>Clerodendrum phlomidis</i> L.f.	Lamiaceae	S	RV	W	VR
WII/HARIKE/SG/305	<i>Clitoria ternatea</i> L.	Leguminosae	Cl	PL	W	OC
WII/HARIKE/SG/306	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Cl	PL,SW	W	F
WII/HARIKE/SG/307	<i>Cocculus hirsutus</i> (L.) W.Theob	Menispermaceae	Cl	RV	W	VR
WII/HARIKE/SG/308	<i>Cocculus pendulus</i> (J.R.Forst. & G.Forst.) Diels	Menispermaceae	Cl	PL,RV,	W	R
WII/HARIKE/SG/163	<i>Colocasia esculenta</i> (L.) Schott.	Araceae	H	WL	C	R
WII/HARIKE/SG/164	<i>Commelina benghalensis</i> L.	Commelinaceae	H	PL,AG,RV	W	OC
WII/HARIKE/SG/165	<i>Commelina erecta</i> L.	Commelinaceae	H	RV	W	VR
WII/HARIKE/SG/309	<i>Convolvulus arvensis</i> L.	Convolvulaceae	Cl	WL,SD,PL,AG,RV,SW	W	F
WII/HARIKE/SG/310	<i>Convolvulus prostratus</i> Forssk	Convolvulaceae	Cl	RV	W	R
WII/HARIKE/SG/166	<i>Corchorus aestuans</i> L	Malvaceae	H	SD	W	F
WII/HARIKE/SG/021	<i>Cordia myxa</i> L.	Boraginaceae	T	PL,AG, RV,SW	W	F
WII/HARIKE/SG/167	<i>Coriandrum sativum</i> L.	Apiaceae	H	AG	C	F
WII/HARIKE/SG/022	<i>Crateva religiosa</i> G.Forst.	Capparaceae	T	PL	W	OC
WII/HARIKE/SG/168	<i>Crinum asiaticum</i> L.	Amaryllidaceae	H	RV	O	R
WII/HARIKE/SG/169	<i>Crotalaria burhia</i> Benth.	Leguminosae	H	RV	W	VR
WII/HARIKE/SG/170	<i>Crotalaria medicaginea</i> Lam	Leguminosae	H	PL,AG,RV	W	R
WII/HARIKE/SG/171	<i>Croton bonplandianus</i> Baill.	Euphorbiaceae	H	AG	W	F
WII/HARIKE/SG/311	<i>Cucumis melo</i> var. <i>callosus</i> Rot	Cucurbitaceae	Cl	AG	W	OC
WII/HARIKE/SG/312	<i>Cucumis sativus</i> L.	Cucurbitaceae	Cl	AG	C	OC
WII/HARIKE/SG/313	<i>Cucurbita maxima</i> Duchesne.	Cucurbitaceae	Cl	AG	C	R
WII/HARIKE/SG/172	<i>Curcuma longa</i> L.	Zingiberaceae	H	RV	C	R
WII/HARIKE/SG/314	<i>Cuscuta reflexa</i> Roxb	Convolvulaceae	Cl	PL	W	F
WII/HARIKE/SG/173	<i>Cyathula prostrata</i> (L.) Blume	Amaranthaceae	H	WL,SD	W	VR
WII/HARIKE/SG/023	<i>Cycas revoluta</i> Thunb	Cycadaceae	T	PL	O	VR
WII/HARIKE/SG/338	<i>Cymbopogon martini</i> (Roxb.) W.Watson	Poaceae	G	RV	W	VR
WII/HARIKE/SG/339	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	G	SD,PL,AG,RV,SW	W	F

WII/HARIKE/SG/174	<i>Cyperus michelianus</i> (L.) Delile	Cyperaceae	H	WL,SD,AG,SW	W	F
WII/HARIKE/SG/175	<i>Cyperus rotundus</i> L.	Cyperaceae	H	PL	W	F
WII/HARIKE/SG/340	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Poaceae	G	PL,AG	W	F
WII/HARIKE/SG/024	<i>Dalbergia sissoo</i> DC.	Leguminosae	T	PL, WL, SD, SW, RV	W	F
WII/HARIKE/SG/176	<i>Datura metel</i> L.	Solanaceae	H	PL,AG,RV	W	OC
WII/HARIKE/SG/177	<i>Datura stramonium</i> L.	Solanaceae	H	AG	W	OC
WII/HARIKE/SG/178	<i>Daucus carota</i> L.	Apiaceae	H	PL,AG	C	F
WII/HARIKE/SG/025	<i>Delonix regia</i> (Hook.) Raf.	Leguminosae	T	PL	O	OC
WII/HARIKE/SG/341	<i>Dendrocalamus strictus</i> (Roxb.) Nees	Poaceae	G	PL	W	R
WII/HARIKE/SG/342	<i>Desmostachya bipinnata</i> (L.) Stapf	Poaceae	G	SD,PL,AG,RV	W	F
WII/HARIKE/SG/343	<i>Dichanthium annulatum</i> (Forssk.) Stapf	Poaceae	G	AG	W	OC
WII/HARIKE/SG/026	<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Leguminosae	T	PL, SW	W	VR
WII/HARIKE/SG/179	<i>Digera muricata</i> (L.) Mart.	Amaranthaceae	H	SD,PL,AG	W	F
WII/HARIKE/SG/344	<i>Digitaria ciliaris</i> (Retz.) Koeler	Poaceae	G	PL	W	F
WII/HARIKE/SG/027	<i>Diospyros montana</i> Roxb	Ebenaceae	T	PL	W	R
WII/HARIKE/SG/380	<i>Diplazium esculentum</i> (Retz.) Sw.	Athyriaceae	Fr	WL, SW	W	F
WII/HARIKE/SG/180	<i>Dysphania ambrosioides</i> (L.) Mosyakin & Clemants	Chenopodiaceae	H	SD	W	OC
WII/HARIKE/SG/345	<i>Echinochloa colona</i> (L.) Link	Poaceae	G	AG	W	OC
WII/HARIKE/SG/181	<i>Echinops echinatus</i> Roxb	Compositae	H	RV,	W	VR
WII/HARIKE/SG/182	<i>Eclipta prostrata</i> (L.) L	Compositae	H	WL,SD,SW	W	F
WII/HARIKE/SG/028	<i>Ehretia laevis</i> (Rottler ex G. Don) Roxb.	Boraginaceae	T	PL,SD,AG, RV, SW	W	F
WII/HARIKE/SG/372	<i>Eichhornia crassipes</i> (Mart.) Solms	Pontederiaceae	Fv	WL, SW	W	F
WII/HARIKE/SG/346	<i>Eleusine indica</i> (L.) Gaertn	Poaceae	G	PL,AG	W	F
WII/HARIKE/SG/183	<i>Emex spinosa</i> (L.) Campd.	Polygonaceae	H	PL,	W	F
WII/HARIKE/SG/381	<i>Equisetum ramosissimum</i> Desf	Equisetaceae	Fr	WL, SW, PL,SD	W	R
WII/HARIKE/SG/347	<i>Eragrostis amabilis</i> (L.) Wight & Arn.	Poaceae	G	SD,PL,RV,	W	F
WII/HARIKE/SG/348	<i>Eragrostis minor</i> Host	Poaceae	G	AG	W	F
WII/HARIKE/SG/184	<i>Erigeron canadensis</i> L.	Compositae	H	PL,AG	W	OC
WII/HARIKE/SG/029	<i>Erythrina variegata</i> L.	Leguminosae	T	PL	W	R
WII/HARIKE/SG/030	<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	T	PL, WL, SD, SW, RV	W	F
WII/HARIKE/SG/095	<i>Euphorbia cotinifolia</i> L	Euphorbiaceae	S	PL	O	VR
WII/HARIKE/SG/185	<i>Euphorbia cyathophora</i> Murray	Euphorbiaceae	H	PL,	W	VR
WII/HARIKE/SG/186	<i>Euphorbia helioscopia</i> L.	Euphorbiaceae	H	WL,	W	OC
WII/HARIKE/SG/187	<i>Euphorbia hirta</i> L.	Euphorbiaceae	H	SD,PL,AG,RV,	W	F
WII/HARIKE/SG/096	<i>Euphorbia milii</i> Des Moul	Euphorbiaceae	S	PL	O	OC
WII/HARIKE/SG/188	<i>Euphorbia prostrata</i> Aiton	Euphorbiaceae	H	PL,RV	W	F
WII/HARIKE/SG/189	<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	H	PL,AG	W	F
WII/HARIKE/SG/190	<i>Euphorbia tithymaloides</i> L.	Euphorbiaceae	H	PL	O	R
WII/HARIKE/SG/191	<i>Evolvulus nummularius</i> (L.) L.	Convolvulaceae	H	PL	W	R
WII/HARIKE/SG/192	<i>Fagonia indica</i> Burm.f.	Zygophyllaceae	H	RV	W	VR
WII/HARIKE/SG/031	<i>Ficus benghalensis</i> L.	Moraceae	T	PL, WL, SD, SW	W	OC
WII/HARIKE/SG/032	<i>Ficus benjamina</i> L.	Moraceae	T	PL	O	OC
WII/HARIKE/SG/033	<i>Ficus carica</i> L.	Moraceae	T	PL	W	R

WII/HARIKE/SG/034	<i>Ficus palmata</i> Forssk.	Moraceae	T	PL,AG, RV, SW	W	F
WII/HARIKE/SG/035	<i>Ficus racemosa</i> L.	Moraceae	T	PL	W	R
WII/HARIKE/SG/036	<i>Ficus religiosa</i> L.	Moraceae	T	PL, WL, SD, SW, RV	W	F
WII/HARIKE/SG/037	<i>Ficus virens</i> Aiton	Moraceae	T	AG	W	R
WII/HARIKE/SG/193	<i>Foeniculum vulgare</i> Mill.	Apiaceae	H	PL	C	R
WII/HARIKE/SG/194	<i>Fumaria indica</i> (Hausskn.) Pugsley	Papaveraceae	H	SD,PL,AG	W	OC
WII/HARIKE/SG/195	<i>Galium aparine</i> L.	Rubiaceae	H	PL	W	F
WII/HARIKE/SG/196	<i>Geranium rotundifolium</i> L	Geraniaceae	H	PL	W	VR
WII/HARIKE/SG/197	<i>Glandularia pulchella</i> (Sweet) Tronc	Verbenaceae	H	PL	W	VR
WII/HARIKE/SG/038	<i>Gmelina arborea</i> Roxb	Lamiaceae	T	RV	W	R
WII/HARIKE/SG/198	<i>Gnaphalium pensylvanicum</i> Willd.	Compositae	H	SD,PL,AG,SW	W	OC
WII/HARIKE/SG/199	<i>Gomphrena celosioides</i> Mart	Amaranthaceae	H	PL	W	OC
WII/HARIKE/SG/097	<i>Gossypium arboreum</i> L	Malvaceae	S	AG	C	R
WII/HARIKE/SG/039	<i>Grevillea robusta</i> A.Cunn. ex R.Br.	Proteaceae	T	PL	W	OC
WII/HARIKE/SG/098	<i>Grewia tenax</i> (Forssk.) Fiori	Malvaceae	S	PL, RV	W	R
WII/HARIKE/SG/099	<i>Hamelia patens</i> Jacq	Rubiaceae	S	PL	O	OC
WII/HARIKE/SG/200	<i>Heliotropium bacciferum</i> Forssk.	Boraginaceae	H	RV	W	VR
WII/HARIKE/SG/201	<i>Heliotropium strigosum</i> Willd	Boraginaceae	H	RV	W	VR
WII/HARIKE/SG/202	<i>Herniaria hirsuta</i> L	Caryophyllaceae	H	RV	W	VR
WII/HARIKE/SG/100	<i>Hibiscus mutabilis</i> L.	Malvaceae	S	PL	O	R
WII/HARIKE/SG/101	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	S	PL	O	OC
WII/HARIKE/SG/040	<i>Holoptelea integrifolia</i> Planch	Ulmaceae	T	PL	W	OC
WII/HARIKE/SG/315	<i>Humulus scandens</i> (Lour.) Merr.	Cannabaceae	Cl	PL,AG	W	F
WII/HARIKE/SG/365	<i>Hydrilla verticillata</i> (L.f.) Royle	Hydrocharitaceae	Sv	WL, SW	W	F
WII/HARIKE/SG/203	<i>Indigofera spicata</i> Forssk.	Leguminosae	H	RV	W	R
WII/HARIKE/SG/316	<i>Ipomoea aquatica</i> Forssk	Convolvulaceae	Cl	WL,SD,SW	W	F
WII/HARIKE/SG/317	<i>Ipomoea cairica</i> (L.) Sweet	Convolvulaceae	Cl	SW	W	F
WII/HARIKE/SG/102	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	S	WL,SD, SW	W	F
WII/HARIKE/SG/318	<i>Ipomoea nil</i> (L.) Roth	Convolvulaceae	Cl	PL,SW	W	F
WII/HARIKE/SG/319	<i>Ipomoea pes-tigridis</i> L.	Convolvulaceae	Cl	PL,SW	W	R
WII/HARIKE/SG/041	<i>Jacaranda mimosifolia</i> D.Don	Bignoniaceae	T	PL	O	OC
WII/HARIKE/SG/103	<i>Jasminum sambac</i> (L.) Sol	Oleaceae	S	PL	O	R
WII/HARIKE/SG/104	<i>Jatropha curcas</i> L.	Euphorbiaceae	S	AG	C	VR
WII/HARIKE/SG/105	<i>Jatropha gossypifolia</i> L	Euphorbiaceae	S	PL	W	R
WII/HARIKE/SG/106	<i>Jatropha integerrima</i> Jacq	Euphorbiaceae	S	PL	O	R
WII/HARIKE/SG/204	<i>Juncus bufonius</i> L.	Juncaceae	H	SD	W	R
WII/HARIKE/SG/107	<i>Justicia adhatoda</i> L.	Acanthaceae	S	RV	W	R
WII/HARIKE/SG/205	<i>Justicia adhatoda</i> L.	Acanthaceae	H	PL	W	R
WII/HARIKE/SG/206	<i>Kalanchoe daigremontiana</i> Raym.-Hamet & H. Perrier	Crassulaceae	H	PL	O	R
WII/HARIKE/SG/042	<i>Kigelia africana</i> (Lam.) Benth.	Bignoniaceae	T	PL	W	F
WII/HARIKE/SG/044	<i>Lagerstroemia indica</i> L.	Lythraceae	T	PL, SD, RV, AG,SW	O	R
WII/HARIKE/SG/045	<i>Lagerstroemia speciosa</i> (L.) Pers.	Lythraceae	T	PL	O	OC
WII/HARIKE/SG/108	<i>Lantana camara</i> L.	Verbenaceae	S	PL, RV	W	F
WII/HARIKE/SG/207	<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	Compositae	H	PL,AG	W	F



WII/HARIKE/SG/043	<i>Lawsonia inermis</i> L.	Lythraceae	T	PL	O	R
WII/HARIKE/SG/370	<i>Lemna minor</i> L.	Lemnaceae	Fv	WL, SW	W	F
WII/HARIKE/SG/208	<i>Lepidium didymum</i> L.	Brassicaceae	H	PL,AGSW	W	F
WII/HARIKE/SG/046	<i>Leucaena leucocephala</i> (Lam.) de Wit	Leguminosae	T	PL	W	F
WII/HARIKE/SG/209	<i>Leucas cephalotes</i> (Roth) Spreng.	Lamiaceae	H	PL,AG	W	VR
WII/HARIKE/SG/210	<i>Ludwigia adscendens</i> (L.) H.Hara	Onagraceae	H	WL,SD	W	OC
WII/HARIKE/SG/211	<i>Ludwigia hyssopifolia</i> (G.Don) Exell	Onagraceae	H	PL	W	R
WII/HARIKE/SG/212	<i>Ludwigia perennis</i> L.	Onagraceae	H	WL	W	R
WII/HARIKE/SG/320	<i>Luffa cylindrica</i> (L.) M. J. Roem.	Cucurbitaceae	Cl	AG	C	OC
WII/HARIKE/SG/109	<i>Lycium edgeworthii</i> Miers	Solanaceae	S	RV	W	VR
WII/HARIKE/SG/213	<i>Lycopersicon esculentum</i> Mill.	Solanaceae	H	AG	C	R
WII/HARIKE/SG/047	<i>Madhuca longifolia</i> var. <i>latifolia</i> (Roxb.) A.Chev.	Sapotaceae	T	AG	C	R
WII/HARIKE/SG/049	<i>Mallotus nudiflorus</i> (L.) Kulju & Welzen	Euphorbiaceae	T	PL	W	R
WII/HARIKE/SG/214	<i>Malva parviflora</i> L.	Malvaceae	H	PL,AG,RV,SW	W	F
WII/HARIKE/SG/215	<i>Malvastrum coromandelianum</i> (L.) Garcke	Malvaceae	H	PLRV	W	F
WII/HARIKE/SG/048	<i>Mangifera indica</i> L.	Anacardiaceae	T	PL	W	F
WII/HARIKE/SG/216	<i>Marsilea quadrifolia</i> L.	Marsileaceae	H	WL,SW	W	F
WII/HARIKE/SG/217	<i>Mazus pumilus</i> (Burm.f.) Steenis	Phrymaceae	H	PL,AG	W	F
WII/HARIKE/SG/218	<i>Mecardonia procumbens</i> (Mill.) Small	Plantaginaceae	H	SD	W	R
WII/HARIKE/SG/219	<i>Medicago polymorpha</i> L.	Leguminosae	H	PL	W	OC
WII/HARIKE/SG/220	<i>Medicago sativa</i> L.	Leguminosae	H	AG	W	R
WII/HARIKE/SG/050	<i>Melia azedarach</i> L.	Meliaceae	T	PL, SD, AG, RV, SW	W	F
WII/HARIKE/SG/221	<i>Melilotus indicus</i> (L.) All.	Leguminosae	H	PL,AG	W	OC
WII/HARIKE/SG/222	<i>Melochia corymbifolia</i> L.	Malvaceae	H	PL	W	R
WII/HARIKE/SG/223	<i>Mentha × piperita</i> L.	Lamiaceae	H	AG	C	R
WII/HARIKE/SG/321	<i>Merremia hederacea</i> (Burm. f.) Hallier f	Convolvulaceae	Cl	SW	W	R
WII/HARIKE/SG/051	<i>Millettia peguensis</i> Ali	Leguminosae	T	PL	O	R
WII/HARIKE/SG/224	<i>Mimosa pudica</i> L.	Leguminosae	H	PL	O	R
WII/HARIKE/SG/052	<i>Mimusops elengi</i> L.	Sapotaceae	T	PL	W	OC
WII/HARIKE/SG/225	<i>Mirabilis jalapa</i> L.	Nyctaginaceae	H	PL	O	R
WII/HARIKE/SG/226	<i>Mollugo nudicaulis</i> Lam.	Molluginaceae	H	SD	W	R
WII/HARIKE/SG/322	<i>Momordica charantia</i> L.	Cucurbitaceae	Cl	AG	C	R
WII/HARIKE/SG/053	<i>Moringa oleifera</i> Lam	Moringaceae	T	PL, AG	W	R
WII/HARIKE/SG/054	<i>Morus alba</i> L	Moraceae	T	PL,SD, AG, RV, SW	W	OC
WII/HARIKE/SG/323	<i>Mukia maderaspatana</i> (L.) M.Roem	Cucurbitaceae	Cl	PL,RV,SW	W	F
WII/HARIKE/SG/110	<i>Murraya koenigii</i> (L.) Spreng	Rutaceae	S	PL	W	R
WII/HARIKE/SG/111	<i>Murraya paniculata</i> (L.) Jack	Rutaceae	S	PL	O	VR
WII/HARIKE/SG/055	<i>Musa × paradisiaca</i> L	Musaceae	T	WL	C	R
WII/HARIKE/SG/366	<i>Myriophyllum spicatum</i> L	Haloragaceae	Sv	WL	W	F
WII/HARIKE/SG/367	<i>Najas minor</i> All.	Hydrocharitaceae	Sv	WL,SW	W	F
WII/HARIKE/SG/373	<i>Nelumbo nucifera</i> Gaertn.	Nymphaeaceae	Fv	WL, SW	W	F
WII/HARIKE/SG/056	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Rubiaceae	T	PL	O	OC
WII/HARIKE/SG/112	<i>Nerium oleander</i> L.	Apocynaceae	S	PL	O	OC

WII/HARIKE/SG/227	<i>Nicotiana plumbaginifolia</i> Viv.	Solanaceae	H	SD, PL, AG	W	F
WII/HARIKE/SG/057	<i>Nyctanthes arbor-tristis</i> L	Oleaceae	T	PL	O	R
WII/HARIKE/SG/374	<i>Nymphaea nouchali</i> Burm.f	Nymphaeaceae	Fv	WL	W	R
WII/HARIKE/SG/375	<i>Nymphoides cristata</i> (Roxb.) Kuntze	Menyanthaceae	Fv	WL	W	VR
WII/HARIKE/SG/228	<i>Ocimum basilicum</i> L.	Lamiaceae	H	PL	O	OC
WII/HARIKE/SG/229	<i>Ocimum tenuiflorum</i> L.	Lamiaceae	H	PL	O	OC
WII/HARIKE/SG/349	<i>Oplismenus burmannii</i> (Retz.) P.Beauv.	Poaceae	G	PL	W	F
WII/HARIKE/SG/385	<i>Opuntia dillenii</i> (Ker Gawl.) Haw.	Cactaceae	Su	RV	W	R
WII/HARIKE/SG/350	<i>Oryza sativa</i> L.	Poaceae	G	AG	C	F
WII/HARIKE/SG/230	<i>Osteospermum fruticosum</i> (L.) Norl	Compositae	H	PL	O	R
WII/HARIKE/SG/231	<i>Oxalis corniculata</i> L.	Oxalidaceae	H	WL, SD, PL, AG, RV, SW	W	F
WII/HARIKE/SG/324	<i>Oxystelma esculentum</i> (L. f.) Sm	Apocynaceae	Cl	PL,AG,RV,SW	W	F
WII/HARIKE/SG/351	<i>Panicum virgatum</i> L.	Poaceae	G	PL	W	F
WII/HARIKE/SG/232	<i>Papaver rhoeas</i> L	Papaveraceae	H	PL	W	R
WII/HARIKE/SG/058	<i>Parkinsonia aculeata</i> L	Leguminosae	T	PL,RV	W	F
WII/HARIKE/SG/233	<i>Parthenium hysterophorus</i> L.	Compositae	H	PL, RV	W	F
WII/HARIKE/SG/352	<i>Paspalum distichum</i> L.	Poaceae	G	WL,SD,SW	W	F
WII/HARIKE/SG/234	<i>Pedaliium murex</i> L.	Pedaliaceae	H	PL	W	VR
WII/HARIKE/SG/235	<i>Peganum multiseptum</i> (Maxim.) Bobrov	Nitrariaceae	H	RV	W	R
WII/HARIKE/SG/353	<i>Pennisetum typhoides</i> Rich.	Poaceae	G	AG	C	OC
WII/HARIKE/SG/325	<i>Pentatropis nivalis</i> (J.F.Gmel.) D.V.Field & J.R.I.Wood	Apocynaceae	Cl	RV	W	F
WII/HARIKE/SG/326	<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	Cl	PL,AG,SW	W	F
WII/HARIKE/SG/236	<i>Peristrophe bicalyculata</i> (Retz.)	Acanthaceae	H	PL,AG	W	F
WII/HARIKE/SG/237	<i>Persicaria barbata</i> (L.) H.Hara	Polygonaceae	H	WL	W	F
WII/HARIKE/SG/238	<i>Persicaria glabra</i> (Willd.) M.Gómez	Polygonaceae	H	WL	W	F
WII/HARIKE/SG/239	<i>Persicaria lanigera</i> (R.Br.) Soják	Polygonaceae	H	WL	W	R
WII/HARIKE/SG/354	<i>Phalaris minor</i> Retz.	Poaceae	G	AG	W	F
WII/HARIKE/SG/059	<i>Phoenix sylvestris</i> (L.) Roxb.	Arecaceae	T	WL, SD, SW	W	OC
WII/HARIKE/SG/355	<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	Poaceae	G	WL,SD,SW	W	F
WII/HARIKE/SG/240	<i>Phyla nodiflora</i> (L.) Greene	Verbenaceae	H	WL,SDSW	W	F
WII/HARIKE/SG/060	<i>Phyllanthus emblica</i> L	Phyllanthaceae	T	PL	W	VR
WII/HARIKE/SG/241	<i>Phyllanthus niruri</i> L	Phyllanthaceae	H	AG	W	R
WII/HARIKE/SG/242	<i>Physalis minima</i> L.	Solanaceae	H	PL,AG	W	OC
WII/HARIKE/SG/376	<i>Pistia stratiotes</i> L.	Araceae	Fv	WL, SW	W	F
WII/HARIKE/SG/243	<i>Pisum sativum</i> L.	Leguminosae	H	AG	C	OC
WII/HARIKE/SG/061	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Leguminosae	T	PL	W	R
WII/HARIKE/SG/113	<i>Platycladus orientalis</i> (L.) Franco	Cupressaceae	S	PL	O	R
WII/HARIKE/SG/244	<i>Pluchea lanceolata</i> (DC.) C.B.Clarke	Compositae	H	RV	W	R
WII/HARIKE/SG/245	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	H	PLRV	W	R
WII/HARIKE/SG/114	<i>Plumeria obtusa</i> L	Apocynaceae	S	PL	O	R
WII/HARIKE/SG/356	<i>Poa annua</i> L	Poaceae	G	PL	W	F
WII/HARIKE/SG/062	<i>Polyalthia longifolia</i> (Sonn.) Thwaites	Annonaceae	T	PL	O	OC

WII/HARIKE/SG/246	<i>Polygonum plebeium</i> R.Br.	Polygonaceae	H	SD	W	R
WII/HARIKE/SG/357	<i>Polypogon monspeliensis</i> (L.) Desf.	Poaceae	G	AG	W	OC
WII/HARIKE/SG/063	<i>Pongamia pinnata</i> (L.) Pierre	Leguminosae	T	PL, AG,RV, SW	W	F
WII/HARIKE/SG/064	<i>Populus deltoides</i> Marshall	Salicaceae	T	WL, SD	C	F
WII/HARIKE/SG/247	<i>Portulaca grandiflora</i> Hook.	Portulacaceae	H	SD,PL,	W	R
WII/HARIKE/SG/248	<i>Portulaca oleracea</i> L	Portulacaceae	H	SD	W	F
WII/HARIKE/SG/249	<i>Portulaca pilosa</i> L.	Portulacaceae	H	SD	W	R
WII/HARIKE/SG/368	<i>Potamogeton natans</i> L	Potamogetonaceae	Sv	WL	W	R
WII/HARIKE/SG/065	<i>Prosopis cineraria</i> (L.)Druce	Leguminosae	T	PL. RV	W	VR
WII/HARIKE/SG/066	<i>Prosopis juliflora</i> (Sw.) DC.	Leguminosae	T	PL, SD, PL, AG, SW	W	F
WII/HARIKE/SG/067	<i>Psidium guajava</i> L.	Myrtaceae	T	PL	C	OC
WII/HARIKE/SG/068	<i>Pterospermum acerifolium</i> Willd	Malvaceae	T	PL	C	VR
WII/HARIKE/SG/250	<i>Pulicaria undulata</i> (L.) C.A.Mey.	Compositae	H	RV	W	VR
WII/HARIKE/SG/115	<i>Punica granatum</i> L.	Punicaceae	S	AG	C	VR
WII/HARIKE/SG/251	<i>Pupalia lappacea</i> (L.) Juss	Amaranthaceae	H	RV	W	R
WII/HARIKE/SG/069	<i>Putranjiva roxburghii</i> Wall	Putranjivaceae	T	PL	O	OC
WII/HARIKE/SG/252	<i>Ranunculus sceleratus</i> L.	Ranunculaceae	H	WL,SDSW	W	F
WII/HARIKE/SG/253	<i>Raphanus sativus</i> L.	Brassicaceae	H	AG	C	OC
WII/HARIKE/SG/327	<i>Rhynchosia minima</i> (L.) DC	Leguminosae	Cl	PL	W	OC
WII/HARIKE/SG/116	<i>Ricinus communis</i> L.	Euphorbiaceae	S	PL	W	F
WII/HARIKE/SG/117	<i>Rosa alba</i> L.	Rosaceae	S	PL	O	R
WII/HARIKE/SG/254	<i>Rumex dentatus</i> L.	Polygonaceae	H	SD,PL,AG	W	F
WII/HARIKE/SG/358	<i>Saccharum officinarum</i> L.	Poaceae	G	,SD,AG,RV,SW	C	R
WII/HARIKE/SG/359	<i>Saccharum bengalense</i> Retz	Poaceae	G	,SDAG,RV,SW	W	F
WII/HARIKE/SG/360	<i>Saccharum spontaneum</i> L	Poaceae	G	PL,AG,RV,	W	F
WII/HARIKE/SG/255	<i>Sagittaria sagittifolia</i> L	Alismataceae	H	WL	W	R
WII/HARIKE/SG/070	<i>Salix alba</i> L	Salicaceae	T	PL, WL, SD	W	F
WII/HARIKE/SG/256	<i>Salvia plebeia</i> R.Br.	Lamiaceae	H	SDSW	W	R
WII/HARIKE/SG/377	<i>Salvinia natans</i> (L.) All.	Salviniaceae	Fv	WL, SW	W	R
WII/HARIKE/SG/384	<i>Sansevieria aethiopica</i> Thunb	Asparagaceae	Su	PL	O	F
WII/HARIKE/SG/071	<i>Schleichera oleosa</i> (Lour.) Oken.	Sapindaceae	T	PL	W	VR
WII/HARIKE/SG/257	<i>Scoparia dulcis</i> L.	Plantaginaceae	H	SD	W	R
WII/HARIKE/SG/072	<i>Senegalia modesta</i> (Wall.) P.J.H. Hurter	Leguminosae	T	RV	W	VR
WII/HARIKE/SG/118	<i>Senna alata</i> (L.) Roxb.	Leguminosae	S	PL	O	R
WII/HARIKE/SG/258	<i>Senna occidentalis</i> (L.) Link	Leguminosae	H	PL,AG,RV,	W	F
WII/HARIKE/SG/073	<i>Senna siamea</i> (Lam.) H.S.Irwin & Barneby	Leguminosae	T	PL	W	OC
WII/HARIKE/SG/259	<i>Senna tora</i> (L.) Roxb.	Leguminosae	H	PL,AG	W	R
WII/HARIKE/SG/260	<i>Sesamum indicum</i> L.	Pedaliaceae	H	AG	C	R
WII/HARIKE/SG/361	<i>Setaria viridis</i> (L.) P.Beauv	Poaceae	G	AG	W	F
WII/HARIKE/SG/261	<i>Sida cordifolia</i> L.	Malvaceae	H	PL,AG	W	F
WII/HARIKE/SG/262	<i>Sida acuta</i> Burm.f.	Malvaceae	H	PL,AG	W	F
WII/HARIKE/SG/263	<i>Sida cordata</i> (Burm.f.) Borss.Waalk.	Malvaceae	H	PL	W	F
WII/HARIKE/SG/264	<i>Sida rhombifolia</i> L.	Malvaceae	H	PL	W	F
WII/HARIKE/SG/265	<i>Sisymbrium irio</i> L.	Brassicaceae	H	SD,PL,AG,RV,	W	F
WII/HARIKE/SG/266	<i>Solanum melongena</i> L.	Solanaceae	H	AG	C	R

WII/HARIKE/SG/267	<i>Solanum nigrum</i> L	Solanaceae	H	PL,AG,RV,	W	F
WII/HARIKE/SG/268	<i>Solanum villosum</i> Mill.	Solanaceae	H	PL	W	R
WII/HARIKE/SG/269	<i>Solanum virginianum</i> L.	Solanaceae	H	PL,AG	W	OC
WII/HARIKE/SG/270	<i>Sonchus oleraceus</i> (L.) L.	Compositae	H	PL,AG	W	F
WII/HARIKE/SG/362	<i>Sorghum halepense</i> (L.) Pers.	Poaceae	G	AG	W	R
WII/HARIKE/SG/271	<i>Spergula arvensis</i> L	Caryophyllaceae	H	SD	W	F
WII/HARIKE/SG/272	<i>Sphenoclea zeylanica</i> Gaertn	Sphenocleaceae	H	SD	W	R
WII/HARIKE/SG/378	<i>Spirodela polyrrhiza</i> (L.) Schleid	Araceae	Fv	WL, SW	W	F
WII/HARIKE/SG/273	<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	H	WL,SD,PL,AGSW	W	F
WII/HARIKE/SG/074	<i>Syzygium cumini</i> var. <i>cumini</i>	Myrtaceae	T	PL, WL, SD, SW, AG, RV	W	F
WII/HARIKE/SG/119	<i>Tabernaemontana divaricata</i> (L.) R.Br. ex Roem. & Schult.	Apocynaceae	S	PL	O	R
WII/HARIKE/SG/274	<i>Tagetes erecta</i> L	Compositae	H	PL	O	OC
WII/HARIKE/SG/075	<i>Tamarix dioica</i> Roxb. ex Roth	Tamaricaceae	T	AG	W	VR
WII/HARIKE/SG/076	<i>Tecoma stans</i> var. <i>stans</i>	Bignoniaceae	T	PL	O	R
WII/HARIKE/SG/077	<i>Tectona grandis</i> L.f.	Lamiaceae	T	PL	W	VR
WII/HARIKE/SG/275	<i>Tephrosia purpurea</i> (L.) Pers.	Leguminosae	H	PL	W	R
WII/HARIKE/SG/079	<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Combretaceae	T	PL, WL, SD, SW,AG	W	F
WII/HARIKE/SG/078	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	T	PL	W	R
WII/HARIKE/SG/328	<i>Tinospora cordifolia</i> (Willd.) Miers	Menispermaceae	Cl	PL,AG,SW	W	OC
WII/HARIKE/SG/080	<i>Toona ciliata</i> M.Roem	Meliaceae	T	PL	W	VR
WII/HARIKE/SG/379	<i>Trapa natans</i> L.	Lythraceae	Fv	WL	W	R
WII/HARIKE/SG/276	<i>Trianthema portulacastrum</i> L.	Aizoaceae	H	PL,AG	W	F
WII/HARIKE/SG/277	<i>Tribulus terrestris</i> L.	Zygophyllaceae	H	PL,RV,	W	OC
WII/HARIKE/SG/329	<i>Trichosanthes dioica</i> Roxb	Cucurbitaceae	Cl	AG	C	R
WII/HARIKE/SG/278	<i>Tridax procumbens</i> (L.) L.	Compositae	H	PL,AG,RV	W	F
WII/HARIKE/SG/279	<i>Trifolium alexandrinum</i> L.	Leguminosae	H	AG	C	F
WII/HARIKE/SG/280	<i>Trifolium dubium</i> Sibth	Leguminosae	H	PL	W	OC
WII/HARIKE/SG/281	<i>Trifolium repens</i> L.	Leguminosae	H	PL	W	R
WII/HARIKE/SG/282	<i>Trifolium resupinatum</i> L.	Leguminosae	H	AG	W	R
WII/HARIKE/SG/283	<i>Trigonella foenum-graecum</i> L.	Leguminosae	H	AG	C	F
WII/HARIKE/SG/363	<i>Triticum aestivum</i> L.	Poaceae	G	PL,AG	C	F
WII/HARIKE/SG/284	<i>Triumfetta rhomboidea</i> Jacq.	Malvaceae	H	PL,AG	W	OC
WII/HARIKE/SG/285	<i>Typha angustifolia</i> L	Typhaceae	H	WL,SW	W	F
WII/HARIKE/SG/286	<i>Urena lobata</i> L.	Malvaceae	H	PL,SW	W	OC
WII/HARIKE/SG/287	<i>Urtica urens</i> L.	Urticaceae	H	PL	W	VR
WII/HARIKE/SG/081	<i>Vachellia farnesiana</i> (L.) Wight & Arn	Leguminosae	T	SW	W	VR
WII/HARIKE/SG/082	<i>Vachellia leucophloea</i> (Roxb.) Maslin, Seigler & Ebinger	Leguminosae	T	RV	W	VR
WII/HARIKE/SG/083	<i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb	Leguminosae	T	PL, WL, SD, SW, AG, RV	W	F
WII/HARIKE/SG/369	<i>Vallisneria natans</i> (Lour.) H.Hara	Hydrocharitaceae	Sv	WL	W	F
WII/HARIKE/SG/288	<i>Verbascum thapsus</i> L.	Scrophulariaceae	H	WL,SD,AG	W	R
WII/HARIKE/SG/289	<i>Verbesina encelioides</i> (Cav.) Benth. &	Compositae	H	SD,PL,AG,RV,	W	F

	Hook.f. ex A.Gray					
WII/HARIKE/SG/330	<i>Vernonia elaeagnifolia</i> DC.	Asteraceae	CI	PL	O	VR
WII/HARIKE/SG/120	<i>Vernonia amygdalina</i> Delile	Compositae	S	PL	O	R
WII/HARIKE/SG/290	<i>Vernonia cinerea</i> (L.) Less.	Compositae	H	PL	W	OC
WII/HARIKE/SG/292	<i>Veronica anagallis-aquatica</i> L.	Plantaginaceae	H	WL	W	R
WII/HARIKE/SG/291	<i>Veronica agrestis</i> L.	Plantaginaceae	H	PL	W	R
WII/HARIKE/SG/293	<i>Veronica persica</i> Poir.	Plantaginaceae	H	AG	W	OC
WII/HARIKE/SG/294	<i>Vicia sativa</i> L	Leguminosae	H	PL	W	R
WII/HARIKE/SG/121	<i>Vigna mungo</i> (L.) Hepper	Leguminosae	S	AG	C	R
WII/HARIKE/SG/122	<i>Withania coagulans</i> (Stocks) Dunal	Solanaceae	S	AG	W	VR
WII/HARIKE/SG/295	<i>Withania somnifera</i> (L.) Dunal	Solanaceae	H	PL	W	VR
WII/HARIKE/SG/296	<i>Xanthium strumarium</i> L.	Compositae	H	PL,SW	W	F
WII/HARIKE/SG/386	<i>Yucca filamentosa</i> L	Asparagaceae	Su	PL	O	VR
WII/HARIKE/SG/297	<i>Zaleya pentandra</i> (L.) C.Jeffrey	Aizoaceae	H	PL,RV	W	VR
WII/HARIKE/SG/123	<i>Zamia furfuracea</i> L.f. ex Aiton	Zamiaceae	S	PL	O	R
WII/HARIKE/SG/084	<i>Ziziphus mauritiana</i> Lam	Rhamnaceae	T	PL, AG, RV	W	F
WII/HARIKE/SG/124	<i>Ziziphus nummularia</i> (Burm.f.) Wight & Arn.	Rhamnaceae	S	RV	W	OC

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